

Innovative Imagery System for Enhanced Habitability onboard ISS: Desired Features and Possible Hardware Applications

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Abstract

With the advent of the ISS and the experience of Russian, European, and US crewmembers on Mir, the importance of the psychological element in long duration missions is increasingly recognized. An integrated imagery system or Magic Window System could enhance the habitability, performance, and productivity for long term stays in space. Because this type of system is a new concept for space, functional and technical requirements need to be determined. As part of a three-year project, the functional and technical requirements for an Imagery System onboard the International Space Station (ISS) have been explored.

Valuable information was gathered from a survey completed by participants that had been in analog environments (remote/isolated) such as Antarctica, Aquarius, ISS crewmember debriefs, and crew support meetings to identify key functions desired for an integrated Magic Window System. Exercise and medical care activities were identified as areas that could benefit from such a system. It was determined that for exercise, it was worth exploring the concept of displaying a dynamic screen that changes as the crewmember's speed changes while showing physiological measures in a combined display. In terms of enhancing the interfaces for medical care activities, the Magic Window System could show video clips along side procedures for just-in-time training scenarios through a heads-up display. In addition, the portability, usability, and reliability were stressed as important considerations for an integrated system of technologies or Magic Window System.

In addition, a review of state-of-the-art screens and other existing technologies such as tablet PCs and Personal Digital Assistants (PDAs) was conducted and contributed to defining technical requirements and feasibility of systems. Some heuristic evaluations of large displays and PDAs were conducted. Finally, feasibility for implementation onboard ISS has been considered. Currently, specific headset units are undergoing usability testing. The outcome of these activities will be valuable to determine the best candidates for an integrated system that could accommodate different needs depending on task.